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EDITORIAL

MORE POWER TO THE FEDERAL FOOD AND DRUG LAW ENFORCERS

GENERALLY speaking, reports of governmental bureaus are informative and thorough—but rarely intriguing enough to read all through. But there has just come to our hands, from the office of information of the U. S. Department of Agriculture, a "release" that is insistently readable and thought-provoking from beginning to end.

It is a document that records the Department's work, during recent months, in its gestures of safegarding John Public from the negligence and wilful malpractices of those who produce and supply him with his food and his drugs. We say gestures advisedly, for it is obvious to all who read the report that only a meager fraction of effective control is reflected in the recorded accomplishments.

Yet how much worse the public might have fared had not these guardians of its welfare contributed even this mite of control, is only an idle conjecture—but in this report is ample warrant and reason for a much greater latitude, much broader powers of supervision than this busy Department now holds.

And someday, when the picayune bickerings of the so-called statesmen and the mean cross-currents of commercial influences at Washington shall cease, and constructive legislation in this field, finally comes to pass—this effective Department should and must have its scope and its powers expanded to many times their present state. Read these abstracts of the report and wonder why in an enlightened age such practices exists—and wonder still more why so important a work is handicapped and curtailed, when silly, willy-nilly projects receive the full endorsement of a money-shovelling officialdom.

"Heavy movements of fruits and vegetables increased the work of inspectors of the Federal Food and Drug Administration in preventing the interstate distribution of insect-infested produce and that carrying excessive poison spray residues. Fruits seized during August because of a wormy condition included 18,700 quarts of blueberries and huckleberries. Two lots of frozen green peas found to be infested with weevils were likewise confiscated.

"Spray residues in dangerous amounts were encountered in the case of 125 bushels of apples, 50 bushels of pears, and 35 crates of cherries, all of which were seized, officials state. Contamination during manufacture in one product and the telltale effects of carelessness in removing spray residues before processing, in another, resulted in the seizure of 35 barrels of cocoa and one lot of apple butter." (Yet what insignificant quantities these must be compared to our country's consumption.)

"The effects of the resumption in July of the campaign for clean crabmeat are reflected in a one-third decrease in the quantity reported for seizure. In August legal action was directed against 2300 pounds as compared with the July figure of 3400 pounds. Seizures of unclean cream and butter likewise declined, the total of cream destroyed during August amounting to 380 gallons, and butter to 16,700 pounds.

"There is no let-up, however, in Food and Drug law enforcement, the Administration finds. The stamping out of one illegal practice merely permits attention to others. Salmon packers, backsliding from their excellent record of last season, when it was not once necessary to resort to seizure action, in August shipped 19 lots which were found definitely objectionable, and seized. These lots, the Administration says, represent a minute percentage of the annual American salmon pack of seven million shipping cases. Alaska cans 90 per cent. of the pack which enters the United States through the ports of Seattle and San Francisco, where it is subject to close supervision and prompt confiscation if decomposed or partially decomposed fish is found.

"Other foods seized on account of decomposition, filth and infestation present at the time of shipment in interstate commerce, were the following: 209 crates of eggs, one lot of canned orange juice, 5 lots of canned tomatoes and 5 of canned turnip greens, mustard greens and spinach, 4 barrels of dressed poultry, and 24 shipments

of tomato sauces, paste, puree and catsup. One lot of domestic tomato paste was also seized because of a label inference that the product was of foreign (Italian) origin. Two lots of so-called olive oil, which were in fact predominantly cottonseed oil, were confiscated on combined allegations of adulteration and representation as a foreign product.

"Substandard canned peaches, peas and tomatoes, were also the objects of legal action during August, say officials. Such articles, when in a wholesome condition and not in violation of the general requirements of the Food and Drugs Act, may be sold legally if labeled to show their true character. However, their sale without such notification works an economic fraud upon the consumer, who is unable to critically examine the food until after having purchased it.

"Other frauds actionable under the law are shown in the Administration's current report: in the seizure of short volume clam juice, short weight jams, jellies and marmalade, short weight butter, butter deficient in butterfat, 'honey' containing cane sugar and corn syrup, imitation vanilla flavor not so labeled, and a 'malt syrup' for which another syrup had been substituted. Liquors masquerading under false colors were two lots of brandy labeled as whisky, and a fermented apple beverage labeled 'Imperial Champyne Americaine'.

"The Food and Drug Administration reports the seizure during August of shipments of 13 patent medicines because of claims of remedial efficacy in the labels, which the articles could not fulfill. They were: 'Andre Stainless Iodine' for sciatica, enlarged glands, rheumatism, skin diseases, chronic bronchitis, gout and goitre; 'An-Idin' for rheumatism, arthritis, lumbago, neuritis, sciatica, enlarged glands, skin diseases, neuralgia and catarrh (the product was also short weight); 'American Desert Tea' for stomach, kidney and bladder troubles, insomnia, rheumatism, neuritis, arthritis, asthma, and as a blood purifier; 'Armstrong's Sore Throat and Quinsy Drops' for quinsy and sore throat; 'Dailey's Pain Extractor' for cuts, piles, ulcers, boils, salt rheum, swellings, rheumatism, eruptions, sore eyes, ringworm, and skin diseases; 'Congoin', consisting of yerba mate, and bearing extreme claims of stimulating effect, among them being 'Absolutely alone it will support life for weeks on end'; 'Gombault's Caustic Balsam' for lameness, inflammation, abscesses, bone spavin, fistula, founder and poll evil of horses; 'Joyz Mate', consisting of

yerba mate, and bearing extreme claims of stimulating effect, among them being 'Taken by itself, without any other food, keeps up the strength and energy of the individual for days at a time'; 'Pneumoseptin' for congestion and inflammation; 'Revigoro Tonic Health Tea' for acute and chronic afflictions of the kidneys, bowels, liver, stomach and bladder, and to aid in the restoration of every active organ, gland and tissue in the human body; 'Stoligal' for painful stomach, biliousness, nausea, and for liver and gall-bladder conditions; and 'Sylvester Haarlem Oil' for stimulating the stomach and digesting organs, to purify the blood and for scurvy, worms, ulcers, sores, boils and abscesses.

"Actions against substandard pharmaceuticals during August included the seizure of one lot of ether adulterated with peroxides, and one of a procaine-epinephrin solution found short volume and deficient in procaine. Two well-known pharmaceutical manufacturers were fined $500 and $400, respectively, for having made shipments of pharmaceuticals which fell below the legal and professed standards."

And so might we continue in merry quotation—except that enough has been recorded to show the little that is being well done—and how much more might be done—should be done—by a Bureau increased in its scope and its powers.

IVOR GRIFFITH.

Early Dentifrices

Although the peoples of ancient and medieval times used various substances for whitening their teeth, tooth paste as we know it today was not introduced until 1900.

Tracing the history of dentifrices from ancient times through the nineteenth century, Miss Martha E. Faulk has reported to the American Pharmaceutical Association that the immediate ancestors of tooth paste were certain "pasty substances" first made in 1847 from various chemicals blended with honey and syrup.

Although these, like tooth paste, were convenient and could be handily carried about, they also deteriorated very easily.

Two other predecessors of tooth paste were tooth tablets, introduced in 1868, and tooth soaps, which were "all the rage" from 1880 to 1900.

ORIGINAL ARTICLES

SEPARATION OF STRYCHNINE FROM CINCHONA ALKALOIDS

By G. E. Mallory and Peter Valaer, Jr.

Bureau of Internal Revenue

FOR many years it was a problem to determine the presence of minute traces of Nux Vomica Alkaloids when in the presence of large quantities of Cinchona Alkaloids and numerous other herbaceous ingredients.

Our problem was the qualitative determination of one or more minims of Tincture of Nux Vomica per fluid ounce of mixture combined with 15 or more minims per fluid ounce of Fluid Extract of Cinchona and small amounts of possibly one or two dozen other herbs containing other alkaloids and also much glucosidal material.

Any one who has had much experience with the qualitative determination of one (1) minim of Tincture of Nux Vomica from 15 or more minims per fluid ounce of Fluid Extract of Cinchona will readily know that it is almost impossible to get a qualitative test for the strychnine.

Several years ago a way was found around this difficulty and it has become more apparent at this later day that it might be of some service to other toxicological chemists interested in the same determinations.

The combined alkaloids are obtained and purified in the usual manner by extraction from alkaline solution, then by acid and in turn again from alkaline solution.

This purified residue is obtained in final form in a 100 cc. pyrex beaker and brought to dryness on the steam bath.

To the residue is added 3 cc. of distilled water, heated over small hole in steam bath with constant stirring with glass rod and for at least 10 minutes, replacing with a small amount of additional water for that which has evaporated. This heating will soften the alkaloidal residue and allow the water to take up the strychnine and

just so much of the cinchona alkaloids. In this manner the ratio of strychnine to cinchona alkaloids is boosted to nearly equality of each. Cool and filter through a very small paper filter placed in a 1-inch glass funnel, having the filter paper when folded cut down to a length of not over one-half inch. When inserted in funnel wet with water and pour through this the alkaloidal solution allowing to go into a 50 cc. pyrex beaker. Wash filter paper with 2 cc. of distilled water and evaporate the solution to dryness in the steam bath by inserting into hole of the bath using beaker tongs. After evaporation the residue will usually be pure white and crystalline. If any strychnine is present a small amount of this crystalline material will readily show up by any of the principal color tests for strychnine.

We find that our best qualitative test is still that of rubbing up a small amount of the above residue with concentrated H_2SO_4 and adding and dragging several small crystals of $K_2Cr_2O_7$ through the acid by aid of a small stirring rod.

Below is given an example of a digestion and extraction of strychnine from colloidal protein material, some procedure may be followed very advantageously from samples containing blood, comminuted viscara, or other similar substance, varying amounts of solutions digested to suit conditions at hand.

In experimenting with the extraction of narcotic and nonnarcotic alkaloids from Horse Saliva we found that a strong digestion with sulphuric acid was needed to break down the colloidal nature of the solution in order that certain of the alkaloids might be completely extracted.

It was found that the most beneficial results were obtained when the colloidal protein solutions were digested for six (6) hours with strong refluxing with 15 per cent. by weight of sulphuric acid.

In one experiment a small quantity of strychnine and very small quantity of morphine were added to large quantities of quinine and caffeine to determine the action of the digestion on these alkaloids and thus liberation from any possible combination which might be formed with the protein matter of the saliva.

Into 100 cc. of Horse Saliva which was of a very thick gelatinous consistency was incorporated, by heating with alcohol and then driving off the alcohol before digestion, the following drugs:

One $\frac{1}{120}$ grain strychnine sulphate hypodermic tablet
.00017 gm. of morphine alkaloid
.3 grain of caffeine alkaloid
.2 grain of quinine sulphate.

The entire amount was digested for six (6) hours with 15 per cent. by weight of H_2SO_4 by strong vigorous refluxing.

The strychnine, caffeine and quinine were recovered by the usual extraction processes for these drugs, the caffeine and quinine being extracted completely as put in the solution.

Just how much strychnine was extracted is problematical but would judge all or practically all was extracted and recovered for the following reason:

The combined alkaloids of cinchona and strychnine gave no tests for strychnine until an extraction was made with water as outlined above and then a mere trace of the crystalline residue gave an exceedingly strong test for strychnine by means of the sulphuric acid and $K_2Cr_2O_7$ crystals.

The morphine was extracted in quantities sufficient to give exceedingly strong tests with Marquis Reagent (formaldehyde sulphuric acid), and several different slides with many crystals characteristic for morphine by Wagner's reagent were obtained.

It is not within the scope of this article to go into detail as to method for the extraction of the morphine.

THE EARLY HISTORY OF DIGITALIS

By Edward Podolsky, M. D.

DR. CAWLEY, the Dean of Brazen Nose College, Oxford, was sick. He was lying in bed, breathing hard and he felt tired in every fiber of his being. Even in bed he felt like a man who had been running a long, hard race. His heart was beating fast and furiously. His legs had grown to almost twice their natural size and the skin on them was tense and glazed; here and there was a small crack in the skin through which a drop of water exuded now and then. The Dean's belly was big, big with stagnated water accumulated from a sluggishly moving blood stream. It did not require much more than a glance to see that Dr. Cawley was suffering from a failing heart.

The Oxford Dean had many friends among the doctors. They came to his bedside and shook their heads gravely. They bled and sweated him. They purged him with calomel and jalap. They forced squills upon him. They scarified his skin to let the water out. But in spite of all their efforts Dr. Cawley lay in bed, breathing hard, alarmingly hard and filling up with water.

In the hospital at Birmingham one of the junior members of the staff, young Dr. William Withering was gaining some sort of reputation with a new medicine for the dropsy. Dr. Withering had been a physician for not more than eleven years. At times he was more interested in plants than in human beings. He gathered the plants of the countryside on his off hours; he described and classified them according to characteristics. He carefully collected his notes for some future day when he intended to write a book based on them.

Dr. Withering was particularly anxious to know just what plants and herbs did once they had gotten into the human body. No source of information did he regard as despicable. There was the old Welsh woman of Shropshire, for instance, who spent the nights over her kettles, brewing a concoction of twenty herbs with which she had cured cases of dropsy when even the ablest of doctors had failed. After much persuasion, Dr. Withering had obtained a handful of her herbs. He spent many an hour analyzing the weird mixture, and at length came to the conclusion that of the melee of twenty

drugs there was but one which was really of any value, foxglove. This plant grew wild, and profusely along the meadow edges through all of England and Wales and every country child knew the convenience of its tubular flower in the business of bumble bee trapping, and the ancient herbals of Wales had long proclaimed its cardiac virtues.

The old crone of Shropshire with her wonderful dropsy medicine had impressed Dr. Withering profoundly. He determined to learn all that he could about foxglove. It seemed that not only the old woman of Shropshire knew about foxglove. There was also a man in Warwick who possessed a famous family recipe for dropsy in which foxglove was the chief ingredient. In Yorkshire he learned that it was customary for the inhabitants to drink quantities of tea brewed from foxglove whenever they had become dropsical.

On one occasion Dr. Withering saw something in Yorkshire which made a deep impression on him. He had been called in to see a tradesman who was vomiting incessantly; his vision had become indistinct, and his heart was beating at an alarmingly slow rate. After a great deal of questioning Dr. Withering learned that the tradesman's wife had stewed a large handful of green foxglove leaves in half a pint of water and had given it to him to drink at one draught. It had ridden him of his dropsy, but it also had brought on a chain of unpleasant symptoms. The observant doctor realized that too much of a good thing was bad.

When Dr. Withering had been called in to treat the Dean of Brazen Nose College he was firmly convinced that foxglove was the one medicine which would help him. He prescribed a solution of the drug which he himself had carefully prepared. With the passing of the hours the medicine began to work wonders. The Dean's face became natural in color; his heart began to beat slower and in more ordered rhythm. The water left his legs and belly. To the end of his days Dr. Withering prized a letter which he had received from Dr. Cawley's brother who insisted that Dr. Withering with his foxglove had saved the Dean's life on that occasion and had prolonged it for a year.

It was in 1775 that the Dean had been cured with foxglove. Dr. Withering prepared great quantities of the wonderful medicine which he used in all his cases of heart disease. He obtained such wonderful results that his reputation grew by leaps and bounds.

In 1779 Dr. Withering had a phenomenal run of luck. Scarlet fever was stalking the country side. Not much was known about the disease in those days, and quite frequently it crippled the heart before anything could be done to prevent it. The number of dropsy cases increased greatly. It was customary to treat such cases with squills. Some were helped, but many had relapses. Dr. Withering saw here the opportunity to use his beloved foxglove. It proved to be the one medicine which aided crippled hearts back to recovery. It alone saved many lives which otherwise would have been lost in spite of squills and blood letting.

It didn't take long before other doctors began to evince an interest in foxglove. Dr. Withering seemed particularly anxious to get Dr. Hope to use foxglove in his cases of heart disease. Dr. Hope was somewhat skeptical, but he would try. The doubting doctor did try, and the success of the trial impressed him so much that he began to proclaim the virtues of this drug to his colleagues. It was Dr. Hope who succeeded in having official recognition given to digitalis as it was now becoming known. It 1783 digitalis made its appearance in the Edinburgh Pharmacopoeia.

After its official recognition Dr. Withering's foxglove began to find many friends. Among its earliest advocates who did much to popularize it were Drs. Stokes, Duncan and Hamilton. Dr. Stokes read an essay on the virtues of the new drug before the Medical Society at Edinburgh and found a great many new friends for digitalis. Dr. Duncan and Dr. Hamilton began to use it in all their cases of heart disease at the Hospital in Edinburgh.

In the meantime Dr. Withering was conducting a most searching study on his own cases. From 1775 to 1785 he kept a careful record of his observations. In the latter year he published his book on the drug AN ACCOUNT OF THE INTRODUCTION OF FOXGLOVE INTO MODERN MEDICINE. He had intended to carry out the study longer, but he was forced to publish his account in 1785 because another physician was getting ready to claim credit for himself as having discovered this most remarkable of heart medicines.

The ACCOUNT is still one of the classics of medical literaure. In that book Dr. Withering had described all that digitalis could do in heart disease. Modern physicians could hardly improve on his observations. About its action on the heart he said: "It has a power

over the motion of the heart to a degree yet unobserved in any other medicine, and this power may be converted to salutary ends."

Dr. Withering knew not only what the drug would do, but most important of all he knew when to stop giving it. His instructions on this point were most explicit: "Let the medicine be continued until it either acts on the kidneys, the stomach, the pulse or the bowels; let it be stopped upon the first appearance of any of these effects."

As with so many other great discoveries Dr. Withering had to contend with prejudice and ignorance. Digitalis was not receiving the recognition that he felt was due it. But he harbored hope in his heart; he knew just how valuable digitalis would some day be: "In spite of opinion," he said, "prejudice, or error, time will fix the real value upon this discovery and determine whether I have imposed upon myself and others or have contributed to the benefit of science and mankind."

Time did fix the real value of digitalis. It proved it to be the greatest of all heart medicines. As the years went by interest in this drug grew. The chemists began to take the mysterious drug apart; they wanted to learn just what it was made of. It remained for Dr. Schmideberg, a famous German chemist, to discover that digitalis consisted of three active principals. These he called digitoxin, digitalin and digitalein.

In spite of brilliant chemical research the real nature of digitalis remained a mystery. Attempts to evaluate its curative ability on a chemical basis did not help much. Other methods had to be tried. This at length led to the introduction of a study of what the drug would do when given to small animals. Among the animals used were rabbits, cats, and guinea pigs. Frogs were also used, but the frog method never became popular, nor was it very accurate.

In 1910 the second great name entered into the history of digitalis, when Dr. Hatcher introduced the cat method of evaluating the effectiveness of the great heart medicine. Dr. Hatcher injected a solution of digitalis directly into the blood stream of a cat and determined just how much of the drug was required to bring the action of the heart to a standstill. By this means he was able to estimate the action of digitalis directly on the mammalian heart (the cat's heart is practically the same as the human heart).

The next great name in the history of digitalis was that of Dr. Eggleston who established the scientific dosage of the drug. One of the most important results of Dr. Eggleston's work was the demonstration of the necessity for using digitalis according to its activity as determined by the cat method of Dr. Hatcher. Dr. Eggleston's study, ten years after Hatcher formulated his cat unit method, also enabled him to determine the amount of digitalis required to produce curing and poisoning effects. Dr. Eggleston devised a method whereby to give digitalis in life saving doses. Heretofore doctors knew how to give the heart medicine in small doses whereby results did not become manifestd in less than four days. This was satisfactory in the mild cases of heart trouble. But there were many cases of severe heart disease which required results in a shorter time. It was Dr. Eggleston who brought mathematics into medicine with life saving results. He found a method of giving digitalis in such doses that results became apparent in a few hours instead of in a few days.

Digitalis was first used to give strength to the failing heart, and today it is still the greatest medicine to tide the heart over a crisis. There is not a doctor anywhere in the world who does not agree that digitalis is the best medicine for the failing heart. It makes no difference what the cause of the failure may be, digitalis acts to slow the heart and to cause it to pump more blood per beat.

As the years went by it was found that digitalis was truly a versatile drug as far as curing sick hearts was concerned. Two American physicians, Drs. Gold and Otto, found that digitalis was capable of exerting a calming effect on a heart which had acquired crazy rhythm. Digitalis regularized the rate of beat and made the patient more comfortable.

Among the most significant contributions of modern medicine to methods of increasing the effectiveness of digitalis medication have been the introduction of two distinct methods of giving the drug. The first was by giving the drug by rectum in such cases where it was impossible to give the drug by mouth or by vein. It was Dr. Cleotta who first pointed out that digitalis might be given by rectum with good results. He found that the blood from the inferior middle hemorrhoidal veins leading from the rectum went directly into that great vein the inferior vena cava which communicates directly with

the heart. It was therefore quite easy to mend the heart through the rectum!

The second of the modern methods of giving the great heart medicine was by vein. This was particularly indicated when very quick action is desired. The French were particularly interested in the possibilities of the vein method, and it was Dr. Nativelle who offered the first of the very purest forms of digitalis for use by vein. Other physicians soon followed suit and there is now a healthy abundance of intravenous forms of digitalis.

Digitalis has now been a recognized medicine for over one hundred and seventy years. It has grown in stature as the years went by until it attained recognition as the greatest of all heart healers. It has been the means of tiding many a human life through a severe heart crisis. It has truly saved lives and made them more worth while living. It is one of the few drugs which is known and loved by every physician on the face of the earth.

Crotyl Alcohol Now Produced at Low Cost

Crotyl alcohol, a compound of great usefulness in research in both medical and industrial chemistry, is now available in pure form at a low price. Hitherto investigation of the possible value of its derivatives has been hampered by its prohibitively high price and also by the impure form in which it has been obtained.

The process of making this hitherto rare alcohol pure, cheap and abundant was described before the meeting of the American Chemical Society by Drs. William G. Young, Walter H. Hartung and Frank S. Crossley of the University of California at Los Angeles.

An impure form of crotyl alcohol has been in use for some time but it has not yielded dependable results and it has been relatively difficult to produce. In the method worked out in the Los Angeles laboratory, it is derived from crotonic aldehyde; which in turn is produced from acetylene. The new method produces four times as much of the pure crotyl alcohol as the old method could obtain of the impure product.

A SURVEY OF THE SPRINGS OF FAIRMOUNT PARK

By Frank N. Moerk, Don. C. A. Butts, F. C. Lawler and P. A. Mattis

Chemistry Department, Philadelphia College of Pharmacy and Science

THIS sanitary survey of the Fairmount Park springs was undertaken as part of the work in sanitation at the Philadelphia College of Pharmacy and Science. The investigation was made in the interest of the public health, and had as its object the determination of the character of the waters from the several springs in order to ascertain their fitness for potable purposes and to locate the source of contamination, if any.

Location of the Springs

The springs have been classified as East and West Park springs, and their location is as follows:

West Park Springs:

Spring No. 1. West side of the West River Drive to the north of Girard Avenue and within a short distance of Black Road.

Spring No. 2. West side of the West River Drive and just south of the Falls of the Schuylkill Bridge.

Spring No. 9. West of Lansdowne Drive and north of Girard Avenue. It is near the Stone Age Statue.

Spring No. 10. In Sweet Brier Valley. It is the lower of the two springs.

Spring No. 11. In Sweet Brier Valley. It is the upper of the two springs and is at the entrance to the valley.

Spring No. 12. Lower end of Lansdowne Valley near Black Road.

Spring No. 16. In Chamounix, about midway between the mansion and Lilacs Station on the Park Trolley System.

Spring No. 17. North side of Johnson's Lane and to the east of Midvale Avenue.

Spring No. 18. To the south of Midvale Avenue, east of Ford Road and within a short distance of Crystal Swimming Pool.

Spring No. 19. Near the car barn of the Park Trolley System.

Spring No. 20. West of Belmont Avenue, between North George's Hill and Wynnefield Drives.

Spring No. 21. To the south of the return Speedway Drive, between Ford Road and Belmont Drive.

Spring No. 22. Between Belmont Avenue and Belmont Drive, south of the Belmont Mansion.

East Park Springs:

Spring No. 3. East side of East River Drive, south of the Park Trolley Bridge and near the Canoe House.

Spring No. 4. On the east side of East River Drive a short distance to the south of the Grant Monument.

Spring No. 5. On Fountain Green Drive north of the East River Drive at the Grant Monument.

Spring No. 6. To the east of East River Drive and to the south of Fountain Green Drive, near the Grant Monument.

Spring No. 7. On the north fork of Tam O'Shanter Road close to the East River Drive.

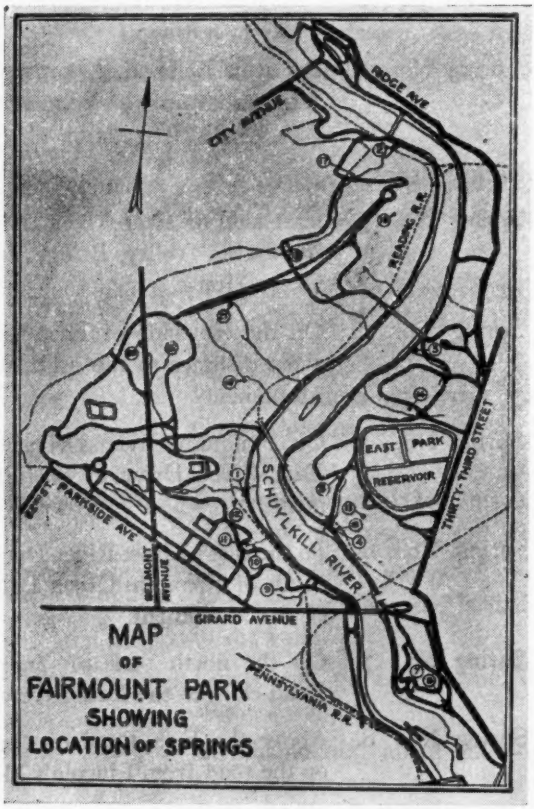
Spring No. 8. Above the Fish Pond on the north side on the road from Lincoln's Monument on

the East River Drive to Girard Avenue Bridge.

Spring No. 13. Between Fountain Green and Reservoir Drives, near the south rear entrance to the Smith Playground.

Spring No. 14. At the head of Ormiston Valley near the junction of Edgely and Reservoir Drives.

The accompanying map of the Park shows the approximate position of the springs from which samples were obtained.



Collection of Samples

Samples were gathered from the several springs on March 29, April 5, 12, and 26, May 3, and on June 24, 1935. Chemical and bacteriological samples were collected simultaneously, and additional samples for bacteriological examination were later obtained from those springs whose waters gave positive presumptive tests for the presence of B. Coli. Independent samples were gathered for microscopic examination on April 5, and June 24, 1935.

Analytical Procedure

The examination of the samples was conducted in accordance with the recommendations set forth in the Standard Methods of Water Analysis of the American Public Health Association, with the following exceptions:

1. In the bacteriological examination the presence of acid forming bacteria and B. Coli, were determined in two 10 cc. portions instead of the five proscribed portions. This practice was adopted because of the normally low bacterial count of isolated ground waters.
2. In the microscopic examination 3,000 cc. of samples were concentrated to 10 cc. for the total count, and the count was supplemented by a transfer from the counting chamber to a microscopic slide under high dry magnification for confirmation of the identity of the micro-organisms that were enumerated in the count. The results were expressed in terms of organisms per liter instead of the customary terms of organisms per cubic centimeter, and the spores were excluded from the total count and listed separately.

Analytical Data

Tables I and II show, respectively, the results of the examination of the West Park and East Park springs.

The influence of the geological formation upon the character of the waters, particularly with respect to the variations in hardness and mineral content, is apparent from the chemical analyses. The life cycle of the vegetative cover and the activities of the soil bacteria are responsible for the presence of carbon dioxide, ammonia and nitrates, which find their way into the ground water by the leaching action of

rainfall, and the amounts of these constituents are, in a measure, related to the density of the cover. A study of the ammonias (free and albuminoid), nitrite, nitrate and organic content shows the waters to be free of pollution arising from decomposition products of human origin. In the light of the complete analytical data the abnormally

ANALYSES OF WATERS FROM WEST PARK SPRINGS

	SPRING NUMBER												
	1	2	9	10	11	12	16	17	18	19	20	21	22
Weather	C	C	R	R	R C	R	C	C	R C C	R	R C C	R	R C
BACTERIAL													
Total Count/cc Agar	4	1	1	1	1 1	1	0	0	8 1 120	2	1 2 0	0	2 1
Gelatin	5	8	27	0	2 1	8	1	2	10 7 liq	3	0 0 5	1	2 2
Acid Forming Bact	+	–	+	–	+ –	+	–	–	+ + +	–	+ – –	–	– –
B. Coli. Presumptive	–	–	–	–	+ –	–	–	–	+ + +	–	+ – –	–	– –
" " Confirmed	–	–	–	–	– –	–	–	–	+ + +	–	+ – –	–	– –
MICROSCOPICAL													
Total Count/1,000 cc	1,650	10,090	4,950	2,640	53,460	58,080	43,230	330	2,970	2,640	990	2,310	3,960
Diatomaceae	0	0	330	0	660	0	0	0	330	660	0	0	0
Algae	990	10,090	4,620	2,640	52,800	58,080	43,230	330	990	1,980	990	990	330
Fungi	660	0	0	0	0	0	0	0	1,650	0	0	1,320	3,630
Spores	990	0	1,650	1,320	0	0	0	990	990	0	990	1,320	1,980
CHEMICAL													
Turbidity (p.p.m)	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Oxygen Consumed	1.013	0.503	1.670	1.870	2.630	2.735	0.910	1.620	2.530	2.130	1.320	0.510	1.520
N. as Free Ammonia	0.009	0.020	0.013	0.012	0.025	0.010	0.000	0.008	0.012	0.006	0.006	0.006	0.004
" " Alb. Ammonia	0.027	0.035	0.028	0.050	0.028	0.015	0.022	0.019	0.021	0.012	0.014	0.012	0.018
" " Nitrite	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
" Nitrate	1.650	0.367	1.750	4.670	5.600	1.750	1.130	1.400	0.600	0.600	0.480	0.730	0.330
Carbon Dioxide CO_2	23.390	13.580	26.410	43.770	53.580	41.500	21.130	12.830	32.460	14.340	27.160	36.970	28.670
Alkalinity $CaCO_3$	3.430	8.000	24.000	19.430	52.580	18.290	26.290	11.430	27.430	14.860	20.570	19.430	12.570
Hardness $CaCO_3$	60.000	60.000	76.000	120.000	124.000	52.000	58.000	76.000	56.000	32.000	52.000	72.000	86.000
Total Solids	142.000	117.500	155.000	353.000	226.100	129.300	92.200	143.500	110.000	57.700	75.500	100.000	176.400
Carbonate CO_3	2.060	4.800	14.400	11.660	31.500	10.970	15.770	6.860	16.460	8.920	12.340	11.660	7.540
Chloride Cl	25.150	10.480	14.670	102.700	14.670	36.680	13.620	23.100	17.820	11.530	10.480	11.530	29.340
Nitrate NO_3	7.310	1.630	7.750	20.690	24.810	7.750	5.010	6.200	2.660	2.660	2.130	3.730	1.460
Sulphate SO_4	40.720	49.770	55.530	18.920	66.630	9.460	18.130	57.200	17.720	3.710	16.480	16.890	49.440
Silica SiO_2	13.900	10.200	8.400	16.000	4.200	14.200	16.400	9.000	12.400	13.400	12.600	12.000	10.500
Iron + Alumina Fe_2O_3 Al_2O_3	1.000	0.300	2.000	0.500	1.800	0.600	0.900	0.000	0.000	0.000	0.500	0.300	0.200
Calcium Ca	13.900	12.930	16.420	26.000	45.000	17.500	10.860	30.100	10.700	4.210	5.860	8.930	13.430
Magnesium Mg	6.330	5.220	9.130	14.370	14.660	5.830	2.130	7.990	4.230	0.410	2.530	3.490	10.640
Alkalies as Na	12.190	10.150	13.770	63.270	4.300	8.620	14.830	0.350	13.400	12.570	13.450	9.500	13.430

C = Clear · R = Rain

high chloride content of Springs Nos. 10 and 14 is without sanitary significance, and may be attributed to the practice of using either calcium chloride to allay dust or rock salt to remove ice from the drives during icy weather.

In the microscopical examination only those micro-organisms were found that are normally present in unpolluted fresh waters. The wide variation noted in the total count is due to the seasonal development of the micro-organisms, since the lower counts were associated with the samples collected in early April and the higher counts with those gathered late in June.

ANALYSES OF WATERS FROM EAST PARK SPRINGS

	SPRING NUMBER							
	3	4	5	6	7	8	13	14
Weather	C	C	C	C C	C C	C	C	C
BACTERIAL								
Total Count/cc Agar	1	3	0	5 1	1 16	2	0	19
" " *Gelatin*	4	1	0	4 2	2 54	3	1	7
Acid Forming Bact.	+	−	−	+ +	+ +	+	−	+
B.Coli. Presumptive	−	−	−	+ −	+ +	−	−	−
" " *Confirmed*	−	−	−	− −	− +	−	−	−
MICROSCOPICAL								
Total Count/1.000 cc	1,650	660	1,320	330	990	1,980	206,580	8,250
Diatomaceae	0	0	330	330	330	0	0	0
Algae	330	330	660	0	330	330	206,580	8,250
Fungi	1,320	330	330	0	330	1,650	0	0
Spores	1,320	660	990	990	0	1,980	0	0
CHEMICAL								
Turbidity (p.p.m.)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Oxygen Consumed	0.500	0.410	0.810	0.300	1.420	0.709	0.910	1.310
N. as Free Ammonia	0.017	0.006	0.000	0.000	0.000	0.004	0.017	0.009
" " *Alb. Ammonia*	0.027	0.016	0.034	0.009	0.023	0.021	0.008	0.014
" *Nitrite*	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
" " *Nitrate*	0.388	0.440	1.620	1.020	1.380	2.760	1.700	1.700
Carbon Dioxide CO_2	14.300	25.660	33.960	13.580	25.660	21.890	31.690	23.390
Alkalinity $CaCO_3$	9.140	18.300	20.570	9.140	22.860	34.290	20.570	36.430
Hardness $CaCO_3$	54.000	34.000	50.000	50.000	107.000	116.000	84.000	126.000
Total Solids	120.500	120.000	129.000	51.500	226.700	225.400	122.500	446.500
Carbonate CO_3	5.480	10.980	12.340	5.480	13.720	20.570	12.340	18.260
Chloride Cl	10.480	13.620	10.480	9.430	28.300	16.770	14.670	167.680
Nitrate NO_3	1.720	1.960	7.180	4.520	6.110	12.230	7.530	7.530
Sulphate SO_4	46.890	45.240	37.430	19.330	98.710	95.840	34.610	50.670
Silica SiO_2	10.400	9.400	4.200	6.300	10.000	7.600	15.900	7.500
Iron + Alumina Fe_2O_3 Al_2O_3	0.500	0.800	0.100	0.100	0.200	0.320	0.500	2.900
Calcium Ca	10.000	14.300	6.710	3.930	24.640	32.100	10.000	27.140
Magnesium Mg	7.050	0.110	3.320	2.470	13.200	16.140	5.250	14.640
Alkalies as Na	9.110	23.110	22.860	12.060	24.950	9.470	26.300	94.700

C = Clear: R = Rain.

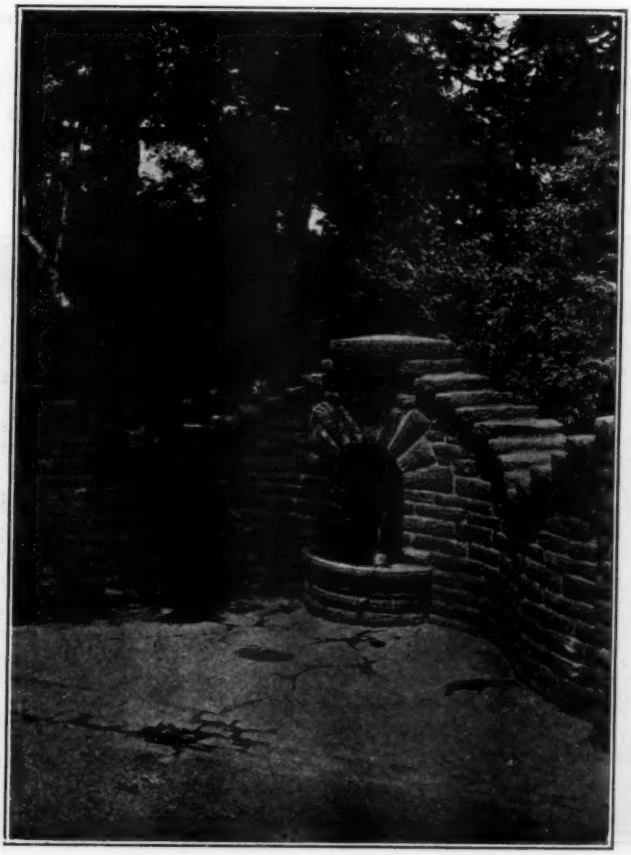
Except in the cases of Springs Nos. 6, 7, 11, 18, and 20, the waters were found to be quite safe for potable uses, as the bacterial count was remarkably low and B. Coli, which serve as the index of intestinal bacteria, were absent.

Spring No. 6. The first sample from this spring gave an unconfirmed presumptive test for the presence of B. Coli in one of the two portions, while a second sample, gathered at a later date, was of much lower bacterial count and was free from B. Coli.

Spring No. 6. Grant Spring.

Since the microscopical examination did not disclose the presence of organisms other than those normally present in unpolluted fresh waters and there was no chemical evidence of measurable contamination, the water from this spring may be considered as of safe potable quality.

Spring No. 7. Despite a low bacterial count an unconfirmed presumptive test for B. Coli was obtained in



Spring No. 7. Tam O'Shanter Spring.

one of the two portions. A second sample, collected sometime later, contained a much greater number of bacteria and gave confirmed tests for B. Coli in both of the portions. It should be noted that just prior to the collection of the second sample a number of children were observed playing about the outlet of this spring. In view of the microscopical and chemical examination, which show no inherent pollution of the water, it is evident that contact of unclean hands with the stone discharge trough was responsible for the contamination.

Spring No. 11. The first sample was obtained during rainy weather and, while the total count was very low, an unconfirmed presumptive test for B. Coli was obtained in both portions. A later

Spring No. 11. Upper Sweet Brier Spring.

sample collected in dry weather was free from B. Coli and of very low total count. This would indicate potential contamination of surface origin during rainfall brought about by the surface run-off either washing the masonry structure and commingling with the discharge or seeping through the structure from the rear and following the short outlet pipe to the discharge. The water is of good potable quality during dry weather, and under normally clean surface conditions would not likely be harmful during wet weather.

Spring No. 18. Three samples were gathered from this spring; the first in wet and the others in dry weather. The presence of B. Coli was confirmed in all cases although the bacterial count was normally much lower during dry weather. However, in

Spring No. 18. Crystal Pool Spring.

the final sample, which was collected after Crystal Bathing Pool had opened, the bacterial count increased enormously. It is quite evident that the water is subject to surface contamination during wet weather, and from bacteriological pollution from the swimming pool during the bathing season.

Spring No. 20. The water from this spring is normally of excellent potable quality. However, the presence of B. Coli was confirmed in the sample collected during rainfall. In view of the analytical data and low bacterial count it may be safely assumed that a portion of the rainfall, contaminated by washing the surface of the masonry structure, traversed the short outlet pipe and commingled with the spring discharge.

Spring No. 20. Wynnefield Spring.

Spring Discharge

At the time of sampling a record was made of the time required to fill the gallon container, and the approximate discharge thus obtained was computed to gallons per day. The following table, in which the springs have been arranged according to their flow, shows their relative magnitude.

RELATIVE MAGNITUDE OF THE SPRINGS

Spring Number	Discharge Gallons per Day
1	10,800
2	9,650
10	9,650
20	7,200
4	6,200
16	5,760
17	5,760
5	5,090
22	4,800
6	4,320
9	4,320
13	4,320
7	2,480
21	2,480
8	2,300
14	2,010
18	1,370
11	1,200
19	1,150
12	910
3	600

Conclusion

Twenty-one of some twenty-seven springs within the confines of Fairmount Park were examined in the course of the survey. Of these springs the five shown in the accompanying photographs (Nos. 6, 7, 11, 18, and 20) gave evidence of varying degrees and frequency of contamination, which in all but one case, that of No. 18, may be eliminated.

The water from Spring No. 6, is normally of good quality but is susceptible to slight periodic contamination, apparently caused by local seepage through the marble panel of the outlet structure which travels along the discharge pipe and enters the water as it is discharged. This condition might be remedied by cutting the horizontal run of the outlet pipe and re-connecting with a union, the larger diameter of which would cause seepage to drip from the lateral pipe and thus be kept out of the spring flow.

Springs Nos. 11 and 20, yield an excellent water in dry weather, but the flow is contaminated by surface wash from the outlet structures in times of rain. The very short projection of the discharge pipe is largely responsible for the admission of the surface water. Lengthening the outlet pipe and installing some type of rain drip thereon would afford protection against this type of contamination. In the case of Spring No. 11, repointing of the brick work would also not be amiss.

Spring No. 7, delivers a good potable water which is subject to contamination as it flows through the stone outlet trough. Children could be discouraged from playing with the water in the trough by the erection of a railing, such as that which is about the font of Spring No. 2. This railing could be so placed as to make access to the trough inconvenient but yet not interfere with the collection of the falling water and, as a consequence, it would tend to protect the water of this spring.

Spring No. 18, gives definite evidence of bacteriological contamination to such an extent as to make the water dangerous for potable purposes. The enormous increase in bacteria following the opening of Crystal Pool to bathers indicates the pool to be the source of pollution. As a consequence, the protection of the public health dictates that this spring be closed.

D. C. A. Butts.
F. C. Lawler.
P. A. Mattis.
F. N. Moerk.

August 19, 1935.

Addenda

PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE,
Philadelphia, Pa.

August 19, 1935.

Mr. Alan Corson, Chief Engineer,
Fairmount Park Commission,
Philadelphia, Pa.

Dear Sir:

The attached report, entitled "A Survey of the Springs of Fairmount Park," is herewith submitted for your consideration and comment.

The progress of the survey was greatly facilitated by the courtesy and co-operation received from the personnel of the Engineer's Office and from the Park Guards.

It is hoped that time will be afforded in the Course in Sanitation during the coming year to extend the survey to the Wissahickon area and to permit the examination of the several remaining Park springs, which were omitted this year because of insufficient available time.

Yours very truly,

FRANK N. MOERK,
Assistant Professor of Industrial Chemistry.

FAIRMOUNT PARK COMMISSION,
Philadelphia, Pa.

September 12, 1935.

Dr. Frank N. Moerk,
Professor of Industrial Chemistry,
Philadelphia College of Pharmacy.
Forty-third and Woodland Avenue, Philadelphia.

Dear Sir:

Permit me to thank you for the very interesting and valuable report upon twenty-one springs in East and West Park.

We, of course, have had bacterial tests made at frequent intervals and at present the Sanitation Bureau attends to this.

The chemical analyses have never been made by us although many inquiries have been made from time to time about which is the best spring water chemically considered.

I hope you will continue to make further reports until all the ninety-one springs in the various Parks have been covered.

I think the course of study and practical application offered to students of your College and which might be made available to anyone for a just fee, is excellent.

Very truly,

ALAN CORSON,
Chief Engineer.

Vitamin Sources

Spinach, traditional rebellion-rouser at the younger generation's dinner table, now has rhubarb and seaweed as rivals in its role of vitamin source.

At the meeting of the American Chemical Society, Prof. E. R. Norris and Mary Simpson, of the University of Washington, reported on their investigation of the vitamin content of seaweed. Seaweed is used as food in various parts of the earth, they pointed out, and indirectly it serves as a vitamin source for all the fish and other animal life of the sea. It is therefore of practical importance to know that several species of seaweed, including those commonly used as human food, are at least fair sources of the scurvy-preventing vitamin C, and also contain vitamin B.

Results of research on spinach and rhubarb were presented in a joint paper by Drs. D. K. Tressler and G. L. Mack of the New York State Agricultural Experiment Station, and Dr. C. G. King of the University of Pittsburgh.

Spinach is not just spinach, their investigations showed. When it is raised in upland gardens it contains about 50 per cent. more vitamin C than is found in spinach raised on muck land. Also, how long it has been on the market is a matter of considerable dietetic importance, for when held at ordinary room temperatures it loses half of its vitamin C in three days and practically all of it in a week. This difficulty can be overcome by chilling, however; spinach kept in a good refrigerator showed very little vitamin C loss. Age at harvesting was not found to be much of a factor, nor was there any significant difference in vitamin content between different named varieties of spinach. The vitamin was found practically altogether in the leaves; very little was present in the stems.

Rhubarb was found to be untemperamental, physiologically. Its vitamin C content was practically constant, regardless of state of maturity. Neither was there any notable difference between the two garden varieties tested.—*Science News.*

PRESERVATIVES, COMPARATIVE EFFICIENCY OF, AGAINST MOULDS. V. Jensen and H. Orner. (*Dansk. Tidss. Farm.*, 1934, *8*, 233, through *Quart. Jour. of Pharmacol. and Pharm.*)—The efficiency of a number of preservatives has been tested against moulds isolated from various pharmaceutical preparations. The organisms employed were: *Saccharomyces Pastorianus, S. apiculatus, Torula alba, T. rubra, Aspergillus glaucus, A. flavus, A. niger, A. fumigatus, Penicillium glaucum, Citromyces Pfefferianus, Cladosporium herbarum, Dematium pullulans, Mucor racemosus, M. Mucedo,* and *Rhizopus nigricans.* These were the strongest strains of a number which were collected. It has been observed that, of the organisms collected from the air in July, 75 per cent. were moulds and only 25 per cent. bacteria, the majority of the latter being saprophytic. Forms of *Penicillium* and *Citromyces* are the most common, followed by *Aspergillus* and sometimes *Mucor.* A petri dish of glucose-agar, exposed to the air for forty-eight hours, was found to give colonies as follows:—*B. subtilis* 21, *Penicillium* 37, *Aspergillus* 14, *Mucor* 18, *Rhizopus* 12, *Cladosporium* 9, *Verticillium* 1, *Citromyces* 11, *Torula* 71, yeasts 11, micrococci 2, and fluorescing bacteria 8. As a summary of a large number of detailed results, the following figures show the greatest dilution at which the growth of all the organisms was prevented. The figures in brackets represent the corresponding values obtained previously for bacteria. Sodium benzoate, 50 (<100); methyl *p*-hypdroxybenzoate, 200 (450); euquinine, 300 (150); ethyl *p*-hydroxybenzoate-sodium, 400; propyl *p*-hydroxybenzoate-sodium, 500 (500); methyl *p*-hydroxybenzoate, <666 (800); propyl *p*-hydroxybenzoate, 700 (800); benzoic acid, 900 (100); trypaflavin, 1500 (3000); benzyl *p*-hydroxybenzoate-sodium, 1700 (1000); methylene blue, 2000 (5000); hexylresorcinol, 2500 (1500); rivanol, 2500 (2500); chinosol, 3000 (2000); methyl violet, 3500 (9000); brilliant green, 3500 (6000); malachite green, 5000 (3000). The series obtained for the dilutions which killed in forty-eight hours was very similar. It must be remembered that the results are affected to a large extent by the nature of the substrate.

G. M.

SCIENTIFIC AND TECHNICAL ABSTRACTS

Compiled by Arthur Osol, Ph. D.

Microchemical Reactions of Pyramidon. M. Wagenaar. *Pharm. Weekblad, 72,* 612, (1935). Through *Analyst, 60,* 575, (1935). The sensitiveness and minimum concentration detectable are given in brackets after each reaction. The solubility of pyramidon in water is 1:17, but considerably less in the presence of sodium chloride, and addition of a crystal of the latter to a drop of a solution in water produces a precipitate of block-shaped crystals (0.1 mgm.); this method is preferable to sublimation as a means of identification by separation. Mayer's reagent (0.05 mgm., 1:200) or solution of potassium cadmium iodide or of potassium zinc iodide (0.2 mgm., 1:100) gives similar block-shaped (or sometimes triangular) yellow-white crystals having angles of 60 degrees and 120 degrees; it is an advantage to add a drop of acetone, which should subsequently be removed by evaporation. The reaction is unaffected by the presence of hydrochloric, sulphuric or acetic acid, and in the case of potassium zinc iodide it is assisted by the presence of hydrochloric acid (cf. Weehuizen, *ibid. 43,* 1105, 1906). Substitution of the potassium iodide in Mayer's reagent by potassium thiocyanate gives isomorphous crystals which are very stable; the melting point of these might be used as a means of identification, and further work on such lines is in progress (cf. Kolthoff and Hamer, *Analyst, 50,* 90, 1925). Platinum chloride in acid solution produces crystals which have the violet color of the oxidation product of pyramidon (cf. following abstract); precipitation is accelerated by scratching (0.1 mgm., 1:100). Gold chloride in the presence of nitric acid gives small yellow needles which form star-shaped groups (0.05 mgm., 1:200); a black color is produced immediately if an acid without oxidizing properties is substituted for nitric acid. Picric acid produces block-shaped crystals on scratching (0.1 mgm., 1:200). *p*-Nitrophenol forms groups of needles (0.1 mgm., 1:200), but the corresponding *o*- and *m*- compounds, and dinitrophenol, are all unsatisfactory for this purpose. A solution of iodine in potassium iodide solution containing hydrochloric, acetic or sulphuric acid gives a heavy precipitate, which, on scratching and addition of a drop of acetone, forms

dichroic block-shaped crystals; these are yellow and have a woolly appearance or else are block-shaped (0.02 mgm., 1:200). An acidified solution of bromine and potassium bromide produces green needles; the reacting drops should be shielded from light (1:100). Quinosol forms groups of star-shaped crystals (0.2 mgm., 1:100), and may therefore be used in the presence of antipyrine, which does not react.

Microchemistry of Antipyrine. M. Wagenaar. *Pharm. Weekblad, 72,* 642, (1935). Through *Analyst, 60,* 576 (1935). The sensitiveness and maximum dilution of the reactions are given in brackets. When antipyrine is sublimed upon a cooled surface it forms thin crystals similar to "ice flowers" (cf. C. Van Zijp, *ibid. 70,* 1245, 1933), and these may be used for the tests described, or even as a means of identification (1 mgm.). The solubility of antipyrine in water is greatly decreased if sodium chloride is present, and numerous *d*-rotary block-shaped crystals are produced on scratching, after addition of a crystal of common salt to a drop of a solution of antipyrine in water. Interference colors can be seen, and the two types of crystals described by Van Zijp (*loc. cit.*) are recognizable, *viz.* hexagonal plates with angles of 128 degrees and 116 degrees, and oblong crystals with an angle of 66 degrees. If antipyrine is warmed with nitric acid, a violet color results, and, on complete removal of the acid by evaporation, groups of white crystals are produced which may conveniently be recognized by the use of crossed Nicols (2 mgm.). The nitrous acid reaction is the best available, and block-shaped, sea-green crystals are produced if a drop each of sodium nitrite solution and hydrochloric acid is added to the crystals obtained by salting-out antipyrine from a solution in water as described above (0.1 mgm., 1:300). Potassium ferrocyanide (after Behrens) followed by sulphuric acid produces thin lozenge-shaped crystals (having an angle of 82 degrees) in star-shaped aggregates (0.1 mgm., 1:200). Star-shaped groups of needles are produced on adding a drop of acetone and then a crystal of potassium ferricyanide to a solution of antipyrine in a drop of dilute hydrochloric acid (0.2 mgm., 1:200). No precipitate results if a crystal of sodium nitroprusside is placed in a drop of a solution of antipyrine in water, but if hydrochloric or sulphuric acid is then added, bundles of crys-

tals are deposited on scratching (0.1 mgm., 1:200). Platinum salts in the presence of hydrochloric acid (after Behrens) form, on scratching, light yellow crystals having an angle of 140 degrees (0.2 mgm., 1:200). If a crystal of sodium iodide is then added, black crystalline masses result which form dark red, feather-shaped crystals; this reaction is less sensitive, but more characteristic, than that obtained with the simple platinum reagent.

A New Reaction of Tartaric Acid. M. Pesez. *J. Pharm. Chim., 127,* 542 (1935). A negative test for tartaric acid with Denigès resorcin-sulphuric acid reaction is not always indicative of the absence of the former. Chromates, permanganates, nitrites, nitrates and chlorates have been reported by Denigès to affect the reaction. In addition to these substances, the present author has found that the per salts of iron and bromates, bromides, iodates and iodides produce abnormal results. Accordingly the following modification is proposed: To 0.1 cc. of a tartaric acid solution add 2 cc. of sulphuric acid (sp. g., 1.84) and 0.1 cc. of reagent prepared by dissolving 2 grams of resorcin and 10 grams of potassium bromide in 100 cc. of distilled water to which is added 1 cc. of sulphuric acid when solution is effected. Heat the test mixture on a water bath. In solutions containing more than 2 per cent. of tartaric acid a blue color develops in one minute, the color becoming more intense upon prolonged heating. In more dilute solutions several minutes heating is required. Upon adding 1 cc. of water, the color changes to a currant red and does not disappear upon the addition of more water. Upon neutralization of the solution, the color changes to violet. In view of the fact that the reaction does not take place if the reagent is replaced by a solution of tribromoresorcin it appears probable that nascent bromine takes part in the reaction. Bromates, nitrates and ferric salts do not interfere with the reaction but in the presence of hypochlorites, chlorates, nitrates, permanganates, iodides, iodates and chromates a negative test is obtained. Hypochlorites, chlorates, nitrates and permanganates may be removed by reduction with zinc and a sulphuric acid solution containing copper sulphate. Iodides may be removed by precipitation with silver nitrate and subsequent reduction of nitrate ion with the zinc-copper couple. Choral interferes

but may be eliminated by heating with sodium hydroxide. Oxalic, benzoic, salicylic, uric, lactic and citric acids, and antipyrine, chloroform, ethanol, methanol and glycerin do not produce a blue color.

By substituting codeine for resorcin in the reagent, a green color is obtained; with vanillin a golden yellow; with naphthol a currant red; and with phenol, pyrogallol, phloroglucinol, guaiacol, thymol, carvacrol, salicylic acid, morphine, apomorphine and epinephrine colors ranging from orange yellow to reddish-brown are obtained.

Microdetermination of Caffeine. G. Denigès. *C. R. Acad. Sci. Paris., 199,* 1622 (1934). Through *Quart. Journ. Pharm. Pharacol., 8,* 236 (1935). The caffeine solution is dried at a low temperature in a porcelain dish, 6 drops of bromine water and normal hydrochloric acid are added, the mixture again heated to dryness at a low temperature, and the heating continued until the residue is a red-orange color, free from yellowness. To the residue are added 10 cc. of distilled water, and 1 drop of a 5 per cent. solution of mercuric acetate in 20 per cent. acetic acid, and the color compared with that obtained by using a definite quantity of caffeine.

The Detection and Determination of 2,4 Dinitrophenol in Tablets and Capsules. Irwin S. Shupe. *Journ. Assoc. Offic. Agr. Chem., 18,* 464 (1935). The following detailed tests are given.

Qualitative Tests.

Extraction.—Treat the sample with water and 4 per cent. sodium hydroxide, filtering if necessary. Transfer the filtrate to a separator, acidify with hydrochloric acid, and extract with chloroform. Evaporate the chloroform on a water bath, allowing the last portions to evaporate spontaneously.

Color Test.—To a portion of the chloroform residue, add 2 cc. of 10 per cent. sulphuric acid and about 0.2 gram of powdered zinc, and allow to stand 10 minutes. A pink color indicates dinitrophenol. Filter, cool, add 10 drops of 1 per cent. solution of sodium nitrite to filtrate, and allow to stand in the dark 5 minutes. Add 2 cc. of a saturated solution of betanaphthol in strong ammonia and allow to stand 2 minutes. Shake with 10 cc. of ether. A pink or violet color should develop in the ether layer.

Microchemical Test.—Prepare a 1:100 solution in 0.1 N sodium hydroxide and place one drop on a glass slide. Add a drop of 1 per cent. hydrochloric acid and examine under the microscope (approximately 100 diameters). If dinitrophenol is present, characteristic, rectangular, pale yellow crystals will be found. Compare with an authentic specimen of 2,4 dinitrophenol.

Melting Point.—If necessary recrystallize the product from hot water and dry in a vacuum desiccator. Determine the melting point by a standard method; 2,4 dinitrophenol melts at 114 degrees C. If desirable, confirm by determining the melting point of a mixture of the unknown and authentic 2,4 dinitrophenol.

Quantitative Method.

Caution: Avoid grinding or heating since dinitrophenol compounds may explode.

Tablets and Capsules.—Count and weigh at least 20 units and calculate the average weight. Macerate the sample with 20 cc. of 2 per cent. sodium hydroxide and transfer with the aid of a little water to a separator. Acidify with concentrated hydrochloric acid. Extract with six successive portions of chloroform, or until extraction is complete. Combine the extracts in a separator, and shake with 20 cc. of 4 per cent. sodium hydroxide solution. Remove the lower layer to another separator and repeat the extraction with 20 cc. portions of sodium hydroxide solution until the yellow color is removed. Transfer the alkaline solutions to a volumetric flask and dilute to mark with water.

Pipet an aliquot containing approximately 0.1 gram of dinitrophenol to a glass-stoppered flask and dilute with water to 100 cc., add hydrochloric acid until neutral, then the 4 per cent. sodium hydroxide solution to slight alkalinity. By means of a pipet, add 20 cc. of 0.1 N bromine (*Methods of Analysis, A. O. A. C.*, 1930, 446, 25(c)), then 5 cc. of concentrated hydrochloric acid, and immediately insert the stopper. Shake the flask for 1 minute. Cool, and add 10 cc. of 15 per cent. potassium iodide solution, being careful that no bromine vapor escapes, and at once stopper the flask. Shake the flask thoroughly, remove the stopper, and rinse it and the neck of the flask with a little distilled water so that the washings may flow into the flask; then add 1 cc. of chloroform, shake the mixture well, and titrate with 0.1 N sodium thiosulphate, using starch indicator.

Each cc. of 0.1 N bromine corresponds to 0.0092 gram of dinitrophenol $(C_6H_3)(OH)(NO_2)_2$; 0.0103 gram of sodium dinitrophenol (anhydrous) $(C_6H_3)(ONa)(NO_2)_2$ and 0.0112 gram of sodium dinitrophenol monohydrate.

Preparation of Standard Solutions of Potassium Bromate. M. L. Yakowitz. *Journ. Assoc. Offic. Agr. Chem., 18,* 505 (1935). Bromate solutions are usually standardized against standard thiosulphate or arsenite solution. It is obvious that it would be more desirable to prepare bromate solutions by weighing pure potassium bromate and dissolving it in sufficient water to give a solution of known strength. The author prepared a batch of pure potassium bromate by three recrystallizations from hot water followed by drying at 140 degrees C. Solutions prepared from this salt on four different occasions during 16 months were standardized against standard solutions of arsenite and thiosulphate and in all cases the normality found by titration checked, within experimental error, the normality as calculated from the weight of potassium bromate used. Standard solutions can be prepared by weighing the pure salt to give a solution with a strength known within 0.05 per cent.

Zinc Pellets for the Generation of Arsine in the Gutzeit Method. P. A. Mills. *Journ. Assoc. Offic. Agr. Chem., 18,* 506 (1935). The many variables in the determination of arsenic by the Gutzeit method influence the final results. Of these, one of the most difficult to control is the supply of hydrogen in the generation of the arsine, for which pure zinc is used. To secure a constant, uniform, duplicable supply of hydrogen, the active surface of the zinc must be the same in each generator.

Confronted with a particularly poor batch of zinc, the writer decided to try molding pellets. The zinc was melted in an iron ladle and cast in a bullet mold. Perfect pellets were obtained, but iron contamination increased the activity enormously. Fresh zinc was then melted in porcelain, and more pellets were made. These proved to be satisfacotry. After this the mold was drilled out to a more suitable size (9 x 12.5 mm.). Tests with several sets of generations with known quantities of As_2O_3 established the uniformity of the pellets.

SOLID EXTRACTS

By Ivor Griffith, Ph. M., Sc. D.

The Dead Sea is getting more interesting every year, for out of its rich sarcophagus, British chemical engineers are lifting each year increasingly vast stores of world important chemicals.

According to Die Umschau, *a German publication, potash from the waters of the Dead Sea, in Palestine, has now reached a production rate of between 2000 and 3000 tons a month. The initial rate, only two years ago, was not more than 1000 tons a month.*

The principal by-product of the potash industry is bromine (essential to the manufacture of the high-powered petrols) which now equals 74 per cent. of the total British requirement for this chemical. Other by-products in economic prospects are potassium sulphate and calcium sulphate, both meeting fertilizer needs of Palestinian soils.

When is a cold not a cold? That is the question—and according to Professor Smillie, of Harvard University, this is the answer!

"Common colds are an infection and are not due to cold weather. Many people think that colds are due to cold weather but this is not so. In Spitsbergen we found that the people were subjected to intensely cold weather and terrific winds all winter without catching cold; but as soon as the boats came in the spring and carriers of cold germs arived, most of the people in Spitsbergen caught colds.

"On Stevenson's 'Treasure Island' in the tropics, which had a population of 746 when we were there, we found an almost perfect paradise as far as weather and environmental conditions are concerned. The people there also caught colds, but not as long as they were isolated from contact with carriers of cold germs.

"At the trading post in Labrador we found that the people did not have any colds all winter until a mailman arrived and brought the cold germs in. Then colds spread to the whole community."

Petromortis is the significant name given to death by carbon-monoxide gas, specifically when the exhaust gases of gasoline engines, which are rich in this wicked constituent, are the lethal agents. An ingenious mid-western farmer, whose premises had been infested with rats, made use of his farm tractor and its toxic exhaust to kill rats in their burrows and in tight enclosures, beneath the floors of his establishment. The exhaust was guided into the rat burrow by means of a rubber hose. After the carburetor was adjusted to obtain a rich mixture, the engine was allowed to run for at least one-quarter of an hour. The hose was then removed and the hole sealed with strips of metal or wood, or if the burrow was in the ground, damp soil was used to clog up the hole, thus confining the gas.

This method does not, however, insure protection against the kind of odors that dead rats are prone to circulate!

About 1849, S. M. Kier, a Pittsburgh druggist, "scientifically studied" a dark oily liquid obtained by his father from a 500-foot brine well at Tarentum, Pa. Action followed quickly and soon the "armamentarium of the physician" was increased by a "wonderful new remedy": "Kier's Petroleum or Rock Oil, a Natural Remedy," etc., etc., etc.

"The healthful balm from nature's spring
The bloom of health and life to man will bring,
As from her depths the magic liquid flows
To calm our sufferings and assuage our woes."

All of this and a lot more piffle for fifty cents a half-pint bottle. The sales averaged 2000 bottles a day—not a bad business when the bottles and labels cost only a few cents each, and the contents between three and four cents. The production exceeded sales, so Kier conceived of the idea of fractionally distilling some of the oil and selling the lighter portion as "Carbon Oil" for burning in lamps (thus displacing to some extent a similar product made from coal and known as "Coal Oil"), and selling the heavier portion to a factory to Cooperstown for cleansing wool.

The pharmacist of a Philadelphia hospital was recently confronted with a request for a cerate of pink spermaceti, and it was insisted that the original ointment had been made from a pink spermaceti. According to our best sources of information pink spermaceti is scarcer than pink whales and our advice to the inquiring reader was to make cerate of spermaceti (U. S. P. VIII) and to color it with an oil soluble pink, available from any dyestuff jobber.

In determining the antiquity of certain documents, or in detecting fraudulent additions to old manuscripts, the chemist has more than frequently relied upon his examination of the inks used. But an examination of the paper also reveals much to the expert. For not only can the identity of the paper be established by microchemical tests, but by establishing such identity the period in which such paper originated is automatically proven. Prior to the ninth century vellum or parchment was used throughout Europe almost exclusively, paper not yet having been introduced from the Orient, and the use of papyrus having been practically confined to Egypt. Then the chronological periods of successive types of paper appear in the following order with the accompanying approximate dates: linen rag paper, ninth century; cotton rag paper, eleventh century; straw paper, 1800; wood pulp paper, 1840; esparto paper, 1860.

Half as many colds during the winter, or even less, as a result of a capsule taken before breakfast. It sounds like a dream or a patent medicine advertisement.

The dream came true, however, for several hundred persons who were the human guinea pigs in the common cold research experimenters at the Lilly Research Laboratories, Indianapolis (Science, Aug. 23.)

The capsules contained measured amounts of cold vaccine made of pneumococci, an influenza organism, streptococci and another organism found in the nose and throat and known to scientists as M. catarrhalis. The capsules were taken with half a glass of cold water half an hour before breakfast. One capsule was taken each morning

for a week and thereafter one or two were taken each week throughout the season.

Of the 445 persons taking the vaccine, 399 had 1089 fewer colds this year than usual, the scientists report. This is a 70 per cent. decrease. The 469 controls, who did not take the vaccine, showed a decrease of only 299 colds during the year, or slightly more than 26 per cent. decrease.

Minerals constitute a most important part of our make-up—and the role of iron in lending color to our tissues has long been understood.

Deficiency of copper in the body may play as important a part in certain forms of anemia as does a deficiency of iron, Prof. C. A. Elvehjem of the University of Wisconsin has reported.

"Though mothers include iron in the baby's diet, generally in the form of spinach or other green vegetables," Prof. Elvehjem said, "a large percentage of so-called well-fed infants when examined by physicians display the symptoms of a noticeable anemia."

In explanation of this he reported that experiments during the past three years on anemic rats indicate that the administration of iron does not stimulate the maximum production of red blood cells unless traces of copper are added to the treatment. He also warned that the administration of over-large amounts of iron to children may cause them to develop rickets.

CONSTITUTION AND BY-LAWS.

CONSTITUTION AND BY-LAWS OF PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE*

Adopted March 27, 1922. Revised December 29, 1924.

CONSTITUTION.

ARTICLE I.

Name.

The name of the Corporation shall be the Philadelphia College of Pharmacy and Science as incorporated by Act of the Commonwealth of Pennsylvania approved March 30, 1822, and subsequently amended by decrees of the Court of Common Pleas No. 1 for the County of Philadelphia, and recorded on September 2, 1878, as the Philadelphia College of Pharmacy, and on May 5, 1920, as the Philadelphia College of Pharmacy and Science.

ARTICLE II.

Objects.

The objects of the Corporation shall be the advancement of Pharmacy and allied Sciences, and the promotion of correlated education and research.

ARTICLE III.

Members.

The College shall consist of Active Members, Corporation Members, Corresponding Members, and Honorary Members.

ARTICLE IV.

Officers and Manner of Election.

The officers of the College shall be a President, two Vice-Presidents, a Recording Secretary, a Corresponding Secretary, and a

*Publication in the AMERICAN JOURNAL OF PHARMACY authorized by the Philadelphia College of Pharmacy and Science, September, 1935.

Treasurer, and their respective duties shall be assigned by the By-Laws.

The officers shall be elected annually at the stated meeting of the College in March, and any vacancy that may occur may be filled for the unexpired term by a special election held at the next stated meeting after the occurrence of such vacancy.

A Librarian, a Curator, and an Editor, shall be elected annually, also, at the stated meeting of the College in March, and any vacancy that may occur may be filled for the unexpired term by a special election held at the next stated meeting after the occurrence of such vacancy.

ARTICLE V.

Board of Trustees.

The Board of Trustees of the College shall consist of twenty-four members, four of whom shall be elected each year at the stated meeting of the College in March, and four at the stated meeting of the College in September, for terms of three years each, and their duties shall be assigned by the By-Laws.

Any vacancy that may occur in the Board of Trustees may be filled for the unexpired term at any regular election of the College after such vacancy shall occur.

The President, the two Vice-Presidents, the Recording Secretary, the Corresponding Secretary, and the Treasurer, shall be *ex-officio* members of the Board of Trustees.

Thirteen members of the Board of Trustees shall constitute a quorum.

ARTICLE VI.

Business.

The right of voting or holding office and transacting business shall be vested solely with the active members.

ARTICLE VII.

Seal.

The College shall have a common seal.

ARTICLE VIII.

By-Laws and Rules.

The College may establish such By-Laws for its government and regulation as may be deemed necessary and proper.

BY-LAWS OF THE COLLEGE.

ARTICLE I.

President and Vice-President.

Section 1. The President, or in his absence, one of the Vice-Presidents, or in their absence, a president *pro tempore,* shall occupy the chair at the meetings of the College, enforce the by-laws or rules, preserve order, and shall give the casting vote when necessary.

Sec. 2. He shall call a special meeting of the College at the request of five members in writing, specifying the object of the meeting.

Sec. 3. He shall appoint all committees, unless otherwise provided for by the By-Laws; and shall sign the diplomas and certificates of the College.

Sec. 4. He shall confer the degrees at the annual Commencement of the College.

ARTICLE II.

Recording Secretary.

Section 1. The Recording Secretary shall keep correct minutes of the proceedings of the College, and preserve all documents belonging thereto that may come into his possession.

Sec. 2. He shall keep a correct list of the members of the College, with the dates of their election, resignation or death.

Sec. 3. He shall issue the notices for the meetings of the College at least one day previous to the time, and furnish the chairmen of all committees with a copy of the minute of their appointment.

Sec. 4. He shall attest by his signature, the diplomas and certificates of the College.

Sec. 5. In the absence of the President, or his inability to act, the First Vice-President, or, in case of his absence or inability to act, the Second Vice-President, shall perform the duties of the President.

ARTICLE III.

Corresponding Secretary.

Section 1. The Corresponding Secretary shall conduct and preserve the correspondence of the College with corresponding and honorary members, and scientific individuals and societies. It shall be his duty to reply to all such communications addressed to or regarding the College. He shall first submit such correspondence to the President for his approval, and the records thereof shall be presented at the stated meetings of the College.

ARTICLE IV.

Treasurer.

Section 1. The Treasurer shall receive and take charge of the general funds of the College, and shall be bonded at the expense of the College. He shall supervise the issuing of all diplomas and certificates of the College; shall have the custody of the seal, and affix the same, or cause the same to be affixed, under the direction of the College or the Board of Trustees.

Sec. 2. He shall collect money due the College, and shall pay no money except as directed by the Board of Trustees.

Sec. 3. He shall present an annual report to the Board of Trustees at the stated meeting in September.

ARTICLE V.

Librarian.

Section 1. The Librarian, under the direction of the Committee on Library of the Board of Trustees, shall have charge of the Library, and shall present an annual report to the College at the stated meeting in March.

ARTICLE VI.

Curator.

Section 1. The Curator, under the direction of the Committee on Museum of the Board of Trustees, shall have charge of the Museum and Herbarium, and shall present an annual report to the College at the stated meeting in March.

ARTICLE VII.

Journal.

Section 1. There shall be published monthly a Journal to be called the AMERICAN JOURNAL OF PHARMACY, the issuance of which shall be under the direction of a standing committee of seven members, of whom the Editor shall be one, elected annually at the stated meeting in March, and known as the Committee on Publication.

Sec. 2. The Journal shall contain original papers, selections from scientific periodicals and books, editorials, reviews, transactions of the College and Board of Trustees, and such other matter as the Committee on Publication may deem desirable to publish.

Sec. 3. The Committee on Publication shall fix the subscription price of the Journal and the salary of the Editor, subject to approval by the College; shall employ necessary assistance; shall keep an accurate account of all receipts and expenditures, and of stock on hand; shall adopt rules and regulations for the proper and successful management of the Journal, and shall present an annual report to the College at the stated meeting in March.

Sec. 4. The College is not responsible for the statements and opinions contained in the contributions to the Journal.

ARTICLE VIII.

Members and Committees.

Sec. 2. Any candidate for active membership must be proposed, in writing, by two members at a stated meeting of the Board of Trustees, and may be balloted for at the next stated meeting, and upon receiving the vote of two-thirds of those members present shall become a member of the College. If any proposed candidate for membership be defeated, the name of such candidate shall not be recorded in the minutes.

Sec. 3. Active members shall pay five dollars annually, in advance, from the date of election. After twenty-five payments of five dollars, the member shall become a Life member and the annual dues shall cease.

Sec. 4. Any Active member, or applicant for Active membership, who shall pay the sum of seventy-five dollars at one time, may

be elected a Life member, and be exempt from all further payments of dues; and all such payments may be kept in a separate fund if desired, from which may be taken annually for the current expenses of the College the sum of five dollars for each Life membership.

Sec. 5. Any firm, corporation or association approving the objects of the College as expressed in the Constitution may be elected a Corporation member. Corporation members shall pay ten dollars annually in advance from the date of election.

A Corporation member shall have all the privileges of active membership, including the right of participation in the meetings and work of the College through a representative appointed by the firm, corporation or association, but shall have no right to vote or hold office; this shall not debar, however, any employee or member of a firm, corporation or association from individual membership and privileges.

Sec. 6. Any Active or Corporation member neglecting to pay the annual dues for two years after they are due, shall forfeit the right of membership; reinstatement may be had upon reapplication and the payment of arrearages.

Sec. 7. Any person approving the objects of the College as expressed in the Constitution, and residing beyond the limits of the United States and dependencies, and of knowledge, skill and integrity, may be elected a Corresponding member of the College.

Sec. 8. No person residing in the United States or dependency shall be chosen a Corresponding member, nor shall any Corresponding member continue such after he or she has removed to and become a permanent resident of the United States or dependency, but may be elected an Active member upon application and the payment of the annual dues.

Sec. 9. Any person whose achievements in Pharmacy and Allied Sciences merit special recognition, may be elected an Honorary member of the College.

Sec. 10. All members shall be entitled to receive THE AMERICAN JOURNAL OF PHARMACY free of charge, unless one year in arrears for dues.

Sec. 11. All members shall have free access to the Library and Museum, subject to the rules and regulations governing the use of such departments.

Sec. 12. Corresponding and Honorary members shall have all the privileges of active membership, but shall be exempt from the payment of annual dues, and shall have no right to vote or hold office.

Sec. 13. Any member on paying five dollars shall be entitled to a certificate of membership, signed by the proper officers and sealed with the seal of the College; such member agreeing to return said certificate to the College on ceasing to be a member.

Sec. 14. A member may be expelled from the College for sufficient cause, by a vote of three-fourths of the Active members present at a stated or special meeting, notice of the intention of the College to consider the subject of the expulsion of the member having been given at a previous meeting, but no member shall be expelled without having been notified and afforded the opportunity of being heard.

Sec. 15. A Committee on Necrology, consisting of three members, shall be appointed at the stated meeting in March, whose duty it shall be to report the deaths of members of the College with appropriate biographical notices.

Sec. 16. A Committee on Nominations shall be appointed annually at the stated meeting in March. This committee shall consist of five members, but not more than two of these shall be members of the Board of Trustees, and no member shall serve on this committee for more than two years consecutively.

It shall be the duty of this committee to report to the College at the annual and semi-annual meetings, one or more names for each office to be filled, including Trustees. The Committee shall send to the Recording Secretary, at least two weeks prior to the date of the election, a list of the proposed nominations, and such list shall be sent to each member with the notice of the meeting.

Any five or more active members may propose a candidate or candidates by submitting to the Committee on Nominations, in writing, such proposition at least two weeks in advance of the meeting. All names so proposed are to be included in the list of nominations sent to members, and also, the names of the proposers.

In the event of the committee failing to submit nominations for any office the meeting shall nominate.

ARTICLE IX.

Board of Trustees.

Section 1. The Board of Trustees shall conduct the affairs of the College and make such By-Laws and Rules and Regulations, and do all such other proper acts as they may deem necessary for the government and support of the College, and also perform such duties as may be, from time to time, committed to them by the College, subject, however, to revision by the College at each stated meeting.

Sec. 2. The stated meetings of the Board shall be held once a month during the months of September, November, January, March, and May, or upon the call of the Chairman.

Sec. 3. The Board shall appoint such standing committees as may be essential for the conduct of its work, and specify the duties of such committees in their By-Laws; and shall appoint such special committees as may be necessary.

Sec. 4. The Board shall be entrusted with the election of members as specified in Article VIII of these By-Laws.

Sec. 5. The minutes of the Board of Trustees, or abstracts of the same, shall be read at the meetings of the College for approval or correction; but the reading may be dispensed with by unanimous consent.

ARTICLE X.

Meetings.

Section 1. The stated meetings of the College shall be held annually on the last Monday of March, and semi-annually on the last Monday of September. If the time of a stated meeting occurs on a legal holiday, the meeting shall be held on the day following, unless determined otherwise at the previous meeting.

Sec. 2. Special meetings may be called at the request of five members, in writing, specifying the object of the meeting.

Sec. 3. Fifteen Active members shall constitute a quorum.

Sec. 4. The order of business at the stated meetings shall be:

1. Members present noted by Secretary.
2. Minutes read, corrected if necessary, and approved.
3. Minutes or abstracts of minutes of Board of Trustees read.

4. Business from the minutes of Board of Trustees.
5. Reports of Committees.
6. Unfinished and deferred business.
7. New business.
8. Adjournment.

ARTICLE XI.

Certificates.

Section 1. The College shall grant certificates to every class of membership when desired; and in the case of honorary membership the certificates shall be issued without cost to the recipient.

Sec. 2. The preparation and issuance of all certificates shall be under the control and direction of the Board of Trustees of the College, and the certificates when issued shall be signed by the President and attested by the Secretary under the seal of the College.

ARTICLE XII.

Amendments.

Section 1. Every proposition to alter or amend these By-Laws shall be submitted in writing at one stated meeting, and may be balloted for at the next stated meeting, when, upon receiving the votes of two-thirds of the members present, it shall become part of the By-Laws.

ARTICLE XIII.

Parliamentary Procedure.

Section 1. In matters of parliamentary procedure not noted in these By-Laws, the College is to be governed by the established usages of similar bodies.